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Self-Regulation and Adaptive Expertise

Few studies have considered how expert and general knowledge influence self-regulation in tasks that require one to adapt or transfer one's expertise to new or unusual cases by analogy. Yet, such cases provide important insights into how to adapt and develop expertise (Ferrari, 1996; Gott, Hall, Pokorny, Dibble, & Glaser, 1993).

This study explores the effect of general and expert knowledge on self-regulation in a task analogous to one typical to subjects' area of expertise. Specifically, 10 experts (black belts) and 10 novices (white belts) in Shotokan karate learned a new sequence of self-defense movements adapted from tai chi (a closely related martial art). The first stage of tai chi is a sequence of 25 complex self-defense movements. The experimental setting involved two video cameras connected to a mixer that combined the information from both cameras into a split screen image; this image was recorded using a video tape recorder. The final split screen image showed the observed model on one half of the screen, and the subject's actual behavior on the other.

All subjects were tested individually in a single 35-minute, 4-part session involving: (1) a 25-minute learning period in which subjects were first shown the whole sequence once, and then encouraged to learn the sequence as they liked (e.g., watch all or part of it, rewind, etc.); (2) a self-evaluation, in which subjects predicted their learning on scale of 1 (very poor) to 10 (perfect); (3) their final performance of the sequence, without the video; and finally, (4) they were asked: "What do you think the movements in this sequence mean?" The entire session was recorded on videotape for later analysis.

Three hypotheses were explored in the study. As compared to novices: (1) given their greater conceptual knowledge, experts should better interpret the self-defense meaning of the new movements; (2) experts should learn more efficiently; and (3) both experts and novices should use domain-general knowledge to self-regulate learning.

Results

MANOVAs were conducted using level of expertise as the independent variable (x2) and both (a) subject's use of the video (x3); (b) learning strategies (x4) and (c) quality and quantity of movements recalled during the final performance, as sets of between-subject variables.

Surprisingly, experts used the video player (watch, imitate, or no-video practice) no differently than did novices, nor did they differ in their use any of four learning strategies (independent, cumulative, and overlapping sections, or whole sequence learning), suggesting that experts may not transfer more domain-general knowledge about how to develop expertise than do novices. Nevertheless, experts were able to transfer domain-specific knowledge when learning the new task, as is shown in two ways. Although experts recalled no more of the sequence (in quantity) than did novices, (1) they produced performances of superior quality to those of novices, $F (2, 17)= 9.75$, $p< .006$, and (2) a Fisher test ($p< .05$) showed that, significantly more experts considered the functional combat applications of the movements than did novices.

Discussion

The present study suggests that the adaptive transfer of expertise is complex and multi-layered. Like Air Force Technicians (Gott et al., 1993), experts in this study know more about the new task, both enactively (as seen in the superior quality of their movements) and conceptually (as seen in the quality of their movements and in their greater comprehension). For their part, novices approached the task with a lot of general knowledge relevant to achieving a successful performance. Since quantitative performance was influenced by the transfer of this nonspecific knowledge, such as general strategies about memorization and about how to effectively use material resources (the video player), novices were able to learn and remember as *much* as did experts, just not as *well*.

References

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